Oil & Gas Truck Traffic Impacts on U.S. 40 Corridor, Utah

in support of the
U.S. 40 Corridor Study

MP 21 in Wasatch County to MP 157 in Uintah County, Utah

Utah Department of Transportation

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1.1 Introduction

Higher prices for raw and refined products in recent years have prompted the oil and gas industries to increase exploration and drilling. Particular emphasis in oil and gas exploration has been occurring domestically in states like Utah. According to the Utah Geological Survey, the number of oil and gas drilling permits in Utah reached 2,062 in 2006, over 6 times the number from 1999 (Utah Geological Survey 2006). Given that the Uintah Basin is Utah's largest and most productive oil and gas development area, the increase of activity related to this industry has primarily affected the basin (Kuhn 2006).

The increased oil and gas activity in the Uintah Basin has instigated an increase in truck traffic along the area's primary highway, U.S. Highway 40 (U.S. 40). Consequently, increased truck volumes have changed traffic conditions along the highway in Utah, especially between milepost (MP) 21 in Wasatch County and MP 157 in Uintah County, which has been the target area for drilling and exploration of oil and gas along the highway.

Changing traffic conditions have diminished the operation of this section of highway, particularly as related to increased truck traffic. These increased volumes have prompted capacity issues due mostly to geographical features of the roadway; increased safety concerns; and degraded highway surface conditions throughout the region. These resulting issues initiated an investigation focused on identifying the specific causes of the problems and on determining mitigation measures that will address the operational and safety challenges associated with the increased truck traffic.

This report focuses on the following:

- **The state of the oil and gas industries in the Uintah Basin :** the state of natural gas, oil, and tar sand mining
- **The relationship between oil and gas and trucking in the Uintah Basin:** how the drilling of oil and gas in the basin relies upon heavy trucks, how oil and gas associated trucks can disrupt the traffic on U.S. 40, and what forecasted truck traffic levels mean to the future of the highway

- **Recommendations and conclusions:** recommendations for improvements that can be made to U.S. 40 in order to enhance traffic safety and promote traffic movement along this route

2.0 The State of Oil and Gas Industries in the Uintah Basin

2.1 Natural Gas Industry

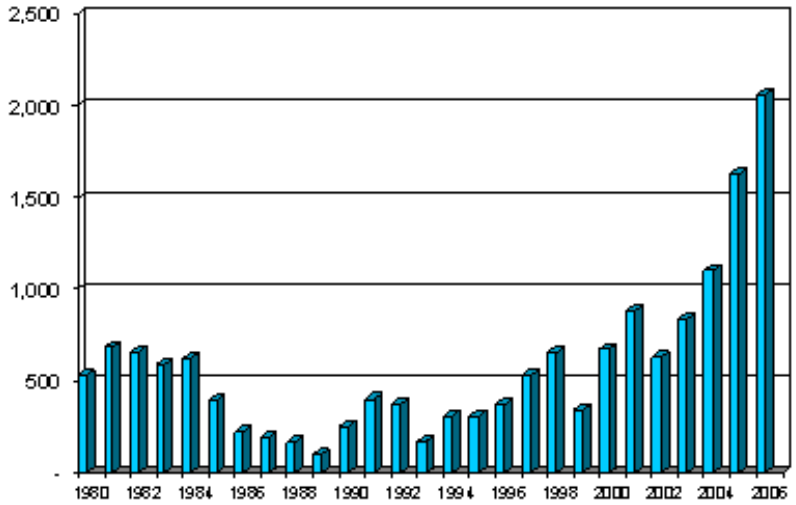
Historical evidence suggests that the market for crude oil has been of a boom-and-bust nature. This is especially true domestically, where voluminous pockets for this resource exist less frequently. Because there are so few areas that contain a large quantity of crude oil, drilling is often concentrated in specific locations that are known or suspected to contain the resource. Oftentimes such intense activity results in an expenditure of funds and then exploration abandonment. For this reason, sourcing natural gas can be more attractive to the energy industry.

The market for natural gas differs from that for oil in several ways. First, shipping gas overseas is difficult, which makes the market for natural gas almost entirely domestic. Thus, the market for natural gas may be considered more stable than oil's global market.

Second, the current market for natural gas is large and demand for this resource is high. The natural gas that is being drilled in Utah is sold for immediate use within a year.

At this time, most of the drilling permits issued by the Bureau of Land Management (BLM) in Utah are for natural gas wells. Figure 2-1 represents the applications for permits to drill in Utah between the years of 1980 and 2006. New natural gas well production primarily affects the area on the east end of the U.S. 40 study corridor, between Roosevelt and Jensen.

Figure 2-1 Utah Applications for Permit to Drill by Year, 1980-2006



Source: The Utah Division of Oil, Gas, and Mining

2.2 Oil Industry

While the market for oil has been volatile in the past, current demand has pushed the price of crude to a point that makes inland drilling speculation feasible. In interviews with oil and gas representatives (Bower 2007; Dean 2007; Moon 2007; Taylor 2007), those involved in the industry expect crude oil production will stay on pace for the next 20 years, limited only by the ability to ship crude oil to refineries or create refining capacity in specific areas. This prediction is backed up by the introduction of financial investment from outside resources (Taylor 2007).

Refining in the Uintah Basin is currently not available, and crude is transported to Wyoming or Salt Lake City for processing. Demand and high prices have oil producers in the basin looking to increase refining capacity by 40,000 to 60,000 barrels a day in Salt Lake City or the basin itself. Uintah and Ouray Reservation representatives are looking into refining on the reservation, as this location would allow immediate access to crude from the basin.

Increased refining capacity could be important to the oil industry in the Uintah Basin as the refineries in Salt Lake City are currently operating at high capacity. The Utah Geological Survey reports that Utah refineries received record amounts of crude oil in 2006, with 20.2% coming from Canada (Utah Division of Oil, Gas, and Mining 2007). Imported crude oil to Utah refineries can pose tight competition for the already slim refining capacity provided for local companies.

The oil extracted from the Uintah Basin must be trucked from the field to a refinery. This mode of transport becomes more expensive the further a refinery is from the field. Consequently, refineries that exist at greater distances from the drilling site make operations less profitable and the development of local refining capacity more attractive.

2.3 Tar Sand Mining

The tar sand deposits within the Uintah Basin have been identified as a prime mining region; there are more petroleum based tar sands between Vernal and Rock Springs, Wyoming, than in Saudi Arabia. With tar sand deposits, mining produces crude oil, asphalt and frac sand (an essential ingredient to the drilling process where it is used to break apart rock strata holding oil and gas reserves). According to a representative of Temple Mountain Energy (TME), the process used to extract the tar sand will enable the local TME mine to be profitable even when crude oil is selling for as little as thirty dollars a barrel (Bower 2007).

Asphalt and frac sand could be very marketable resources for the future of industry in this region. While frac sand is currently trucked in from out-of-state, the development of the proposed TME Mine may create a local source of frac sand for regional drilling operations.

These tar sand reserves, like those of shale oil, could become a reliable asset for crude oil in the future. For extraction of these reserves to be cost-effective, however, oil and gas companies operating in the region may need to finance a science and technological movement to refine oil from these sources at an increased cost-effective capacity. Local companies will also need to facilitate the improvement of the area's infrastructure to enhance convenient transport to the nearest refinery.

To service the oil industry, trucks move crude oil out of the basin for refining then deliver end products, like gasoline and diesel, back into the area. Local refining would allow some of these "full circle" trips to be cut, potentially reducing the number of trucks on the roads.

3.0 Relationship between Oil and Gas Development and Trucking in the Uintah Basin

3.1 Pipelines

In many oil-producing areas, pipelines are used to move crude oil from the drill site to the refinery. As there is no pipeline available to oil companies in the Uintah Basin, producers must move crude oil to the refinery by truck. Even so, investments in a pipeline would not remove a notable portion of the trucks from U.S. 40 for the following reasons:

- The nature of the crude oil pumped from this area is a very waxy substance that is full of paraffin. Thus, the oil does not flow easily through a pipeline.
- Natural gas is currently piped to Salt Lake City, and construction of a proposed north-south pipeline that would connect with the existing east-west pipeline would allow easy transport to many other areas of the country. This north-south pipeline connection may decrease a fraction of the trucks utilizing U.S. 40, but nearly all of the crude oil trucks will continue traveling on this stretch of U.S. 40.
- Removing the "supertankers" (very large trucks having seven or more axles and two trailers) associated with the transport of crude oil would only slightly decrease truck traffic, as supertankers make up less than 5% of the trucks associated with the oil and gas industries.

3.2 Truck Traffic and New Well Construction

Most truck traffic that occurs in association with the oil and gas industries is tied to the production of new wells. While natural gas wells may be productive for twenty to twenty five years, 50% of their output comes from their first year of operation.

When prices are high for natural gas, the reward for moving quickly to open new wells can increase substantially. As a result, there is high demand for trucks to aid in the distribution of construction equipment to the well site, delivery of the drilling rig, removal of waste produced from the digging the well, and production of the final product.

Over the long term, trucks are needed to haul away the water removed during pumping. This is especially true for gas wells, which produce high amounts of water both during the initial drilling process and over the life of the well.

In his report, *Highway Freight Traffic Associated with the Development of Oil and Gas Wells* (2006), Daniel B. Kuhn of the Utah Department of Transportation (UDOT) estimates that new construction requires between 365 and 1,730 large truck trips per well to travel to and from the site. This estimate assumes that:

- The construction equipment will range from 10 to 15 truckloads for a shallow well (5,000 to 12,000 feet deep) to 45 truckloads for deep wells (15,000 to 20,000 feet deep)
- Bringing in the drilling rig to the site will take 30 truckloads

Digging the drill well will require:

- 25 truckloads to fill the water storage ponds and 100 to 1,000 loads of fresh water to aid in the drilling process, depending on the depth of the well
- 50 to 100 truckloads of waste removal
- 10 to 20 truckloads of drilling fluid for breaking up rock strata during well digging
- Up to 10 truckloads of well casing brought in to line the inside of the well
- 2 to 5 truckloads of cement and 2 to 4 truckloads of fly ash for well construction

And to operate the well:

- Replacement of drilling machinery will require another 10 truckloads of equipment
- The removal of the drilling rig, once the well is complete, will again take 30 truckloads
- 1 or 2 truckloads will be needed to complete the well for production
- The completion rig to prepare the well for production will take 130 to 135 truckloads of equipment, and the removal of the rig will take 20 to 25
- 3 to 5 truckloads will be needed to close the reserve pits
- 10 to 12 truckloads of machinery will be needed to run the facility

Overall, average daily truck trips associated with well production can account for approximately 8,000 trucks per day along this section of U.S. 40.

3.3 Current Truck Traffic on U.S. 40

One supertanker holds 280 barrels of oil. In the Uintah Basin, enough crude oil is shipped each day to send 117 supertanker loads to refineries. Fully loaded, each supertanker weighs between 124,000 and 128,000 pounds. So, while they make up a small portion of the total trucking associated with the oil and gas industry, supertankers represent a major obstacle for the average motorist, especially on hills and in no-passing zones.

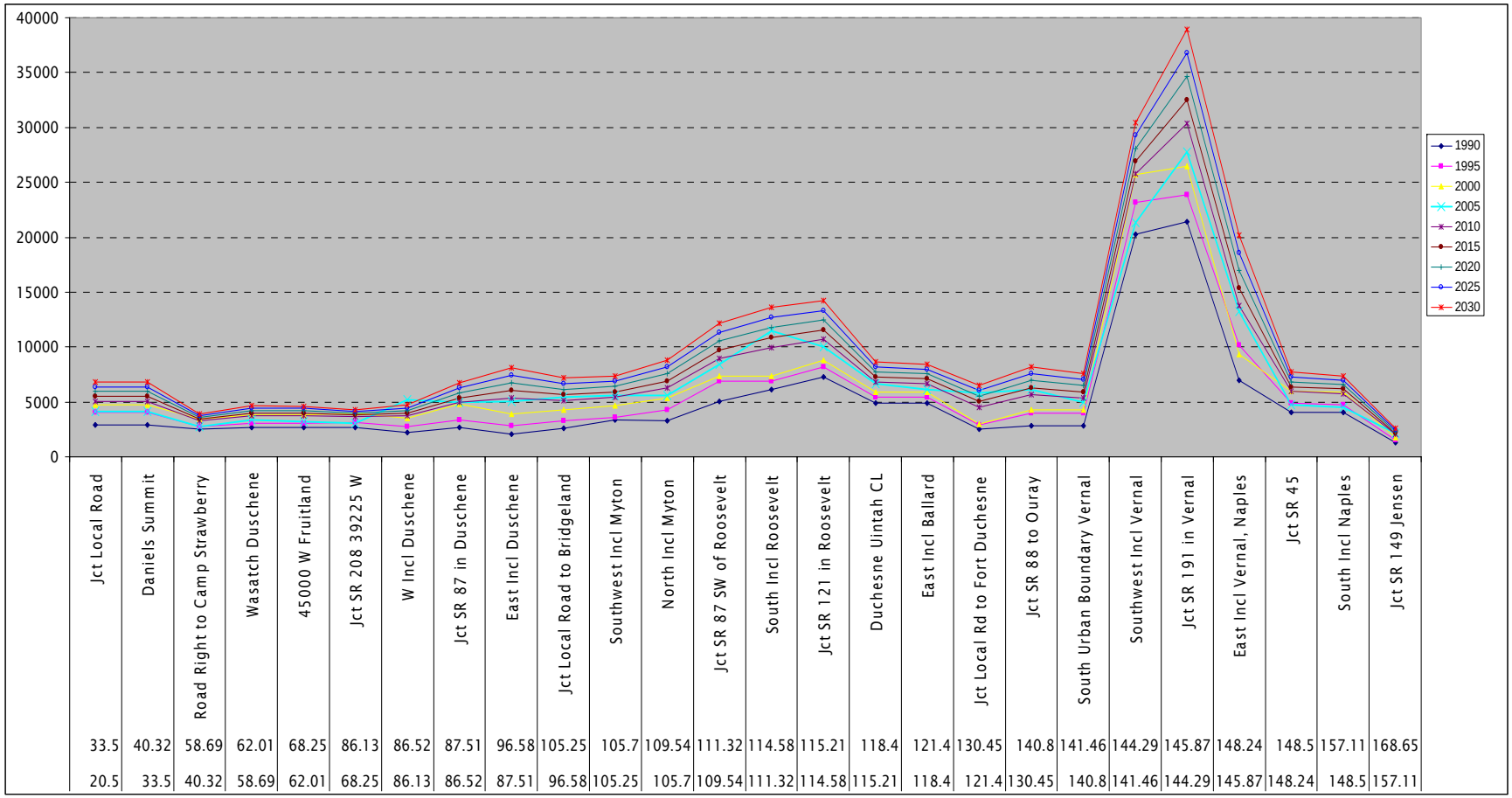
The topography of the U.S. 40 corridor is such that hills are frequent. Steep grades slow down heavy trucks and the traffic behind them, and there is often no passing lane that enables lighter vehicles to overtake the trucks safely.

In some cases, steep grades combine with trucks entering the flow of traffic, causing major bottlenecks. This is the case at the intersection of U.S. 40 and State Route (SR) 88, at which traffic traveling at 65 mph is interrupted by trucks entering the highway up a steep grade. Heavy trucks attempting to get up to speed while climbing a hill may move so slowly that they surprise passenger car traffic and cause hard braking.

3.4 Forecasted Traffic on U.S. 40

Traffic volumes on U.S. 40 are anticipated to increase by an estimated rate of approximately 1.2% over the next twenty years. This rate is based on average historic traffic growth between the years of 1986 and 2005. Figure 3-1 represents anticipated growth for the comprehensive section of U.S.40 studied in the report.

Figure 3-1. Anticipated 2005-2030 Traffic Growth Along the U.S. 40 Project Corridor



Average daily truck traffic volumes on U.S. 40 were obtained from the UDOT website. Based on the published 2005 truck volumes for the 136-mile ling project corridor, an estimated average of 33% of the traffic volume is made up of heavy trucks. It is likely that truck volumes have increased since this time, and it can be projected that truck volumes may reach up to 50% of the total traffic on U.S. 40 in the foreseeable future.

3.5 Long Term Implications for U.S. 40

Based on the abovementioned dynamics for the future of U.S. 40, several implications can be predicted. The following summarizes the primary truck traffic-related concerns and challenges for the future of U.S. 40:

- Traffic volumes are likely to increase on U.S. 40, with equipment bearing truck traffic comprising a large percentage of these volumes.
- Increased truck volumes on U.S. 40 may increase safety concerns on sections of the road, especially at steep grades and urban intersections.
- Increased truck volumes on U.S. 40 are likely to cause accelerated roadway wear and tear.
- A pipeline to transport crude oil out of this area is highly unlikely due to the waxy consistency and sluggish pipeline movement of crude oil from this region. If alternative transport for crude oil is not feasible, crude bearing trucks are likely to continue using U.S. 40 in the foreseeable future.

4.0 Recommendations and Conclusions

The following recommendations are largely based on the information and the findings contained in this report. Interviews with key stakeholders (Bower 2007; Dean 2007; Moon 2007; Taylor 2007) provided crucial knowledge to the research process. Previous recommendations from Daniel B. Kuhn's 2006 report helped to identify additional issues of concern. Lastly, current and forecasted average daily traffic volumes on U.S. 40 were vital to understanding service levels on specific segments of road. These factors aided in the formulation of the following recommendations and conclusions.

4.1 Previous Recommendations

In his report, *Highway Freight Traffic Associated with the Development of Oil and Gas Wells* (2006), Kuhn predicts that truck traffic levels will continue to increase over the next five years in the Uintah Basin. This increase prompted Kuhn to make the following suggestions for improvements to U.S. 40, in order of importance:

1. **Improve junctions where state or country roads handling high numbers of oil and gas-related traffic intersect with U.S. 40:** This would consist of traffic signals in some cases and improved turn pockets and accelerating/decelerating lanes in all cases. The intersections of U.S. 40 and SR 88 between Roosevelt and Vernal, as well as the intersection of U.S. 40 and Pleasant Valley Road west of Myton, are most in need of the aforementioned improvements.
2. **Add passing lanes and passing lanes of adequate length:** This is primarily an issue on U.S. 40 in the inner-basin corridor between Duchesne and Naples, although downhill passing lanes in Daniels Canyon were given high priority. This need also extends to state truck routes that feed energy-related truck and auto traffic into U.S. 40.
3. **Provide full-width shoulders or more frequent safety pullouts:** This is also primarily an issue between Duchesne and Naples, with the Duchesne to Myton and Gusher to Vernal segments of the corridor identified as the route segments with the greatest need.

4.2 Pipeline and Rail Line Recommendations

A pipeline may be one cost-effective solution to the transport of natural gas out of the Uintah Basin. The waxy nature of Utah's crude oil may make pipeline transport impractical, but rail provides a method of transportation for crude oil that does not share many of the problems of trucking on narrow, two lane roads. At this time, some materials coming in to the basin are sent via rail to Craig, Colorado, and then trucked the remainder of the way to the Uintah Basin. There is a proposal to extend rail access from the Craig terminus to a new, local station. The refinery currently under consideration for the Uintah and Ouray Reservation is waiting on the construction of this rail extension as a pivotal element in establishing capacity in the basin.

4.3 Roadway Recommendations

4.3.1 Four Lane Roads

Beyond the need for passing lanes, the forecasted traffic between Duchesne and Vernal warrants an additional through lane in each direction. The study corridor to the west of Duchesne has enough truck traffic that more passing lanes should be provided, but the population of that area is low enough that it does not require a second lane.

4.3.2 Passing Lanes

One significant issue that should be addressed throughout the corridor is passing lanes that are too short to realistically allow a car to get around a truck, some of which stop abruptly at the top of hills. These lanes need to be lengthened so that passenger cars do not get caught at the end of the passing lane unaware.

4.3.3 Access Control

Automobile transportation routes must balance the demand for through traffic flow with that needed for local access. For a highway such as U.S. 40, multiple access points from rural roads, private roads, and driveways can slow traffic considerably. Improved access control such as shared access points and frontage roads would minimize the interruptions caused by traffic entering and exiting the highway. To allow for smooth travel along U.S. 40, particularly given that it is a two-lane highway, access should be restricted or consolidated where possible.

4.3.4 Concrete Intersections

Asphalt is a suitable material for highways, especially in areas that get very cold, where concrete can become very slippery. In the heat, however, asphalt can turn soft. In many urban areas along the corridor, the asphalt is rutted from the heavy stops and starts of trucks at intersections. In these areas, converting the intersections to concrete is advised. Trucks pulling heavy loads would start against a firmer surface, allowing them to get up to speed more quickly, and the road would suffer less damage as a result.

4.3.5 Bypasses/Truck Routes

Truck traffic causes many problems when it is routed through the heart of urban areas. Beyond the safety issues that arise when large trucks are combined with pedestrian and bicycle traffic, there is the detrimental effect that truck noise and fumes have on the quality of life in these areas.

Such is the case in Vernal, where congestion begins as truck traffic on U.S. 40 enters town, causing congestion and brake odor. At this point, the widening of the road to two lanes in each direction may represent the first chance a motorist has to pass since Roosevelt. If drivers seize this opportunity, they are likely not slowing for in-town traffic.

For this reasons, the residents of Vernal may benefit from a truck route that takes heavy vehicles around the community and other pass-through vehicles may benefit from a quicker trip, unimpeded by traffic and signals. A potential bypass roadway is currently being studies in Vernal by the Uintah Basin Transportation Special Services District and is thus not part of the U.S. 40 Corridor Study.

Truck travel through urbanized areas such as Vernal can present challenges for other reasons. The intersections in small towns and cities may be are narrow, making it difficult for trucks to turn while staying in the designated lane. This situation is a particular concern at the intersection of U.S. 191 in Vernal and at the intersection of SR 89 in the city of Duchesne. The combination of intersection configuration and increased speeds needed to overcome truck traffic in urban areas can amplify concerns. This situation is likely to cause increased congestion for all motorists along the targeted sections of U.S. 40 and result in safety concerns.

Further investigation can help identify alternate routes for truck traffic to bypass specific urban areas. Identifying an alternate truck route for key urban areas along U.S. 40 can decrease the need to expand internal community roads and intersections. Decreasing the need for infrastructural roadway improvements

inside townships can potentially decrease urban air pollution, prevent direct impacts to existing homes and businesses, inhibit impacts on historic buildings, and reduce problems associated with traffic congestion.

4.4 Conclusions

4.4.1 Recommendations for Immediate Implementation

- Add passing lanes between Vernal and Roosevelt
- Improve the intersections at U.S. 40/SR 88 west of Duchesne and U.S. 40/Pleasant Valley Road near Myton

4.4.2 Recommendations for the Short Term (over the next 1-5 years)

- Widen the highway between Vernal and Roosevelt to four lanes
- Investigate alternative alignment around the town of Gusher, so that the necessary right-of-way may be purchased and preserved
- Add passing lanes between Roosevelt and Duchesne
- Add concrete intersections in the corridor between Vernal to Naples
- Lengthen passing lanes over hillcrests along entire corridor
- Construct an interchange at the intersection of SR 88 and U.S. 40

4.4.3 Recommendations for the Mid-term (5-15 years)

- Widen the highway from Roosevelt to Duchesne to four lanes
- Add westbound passing lanes in Daniels Canyon
- Construct concrete intersections between Duchesne and Roosevelt

4.4.4 Recommendations for the Long Term (after 15 years)

- Widen the highway between Heber City and Duchesne
- Convert major intersections to interchanges at:
  - Pleasant Valley Road near Myton
  - U.S. 191 in Vernal
  - SR 87 in Duchesne

  - Ioka Junction near Myton
- Widen shoulders to 10 feet throughout corridor
- Build bypass routes around communities

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